

AMENDMENTS TO THE CLAIMS

Pursuant to 37 C.F.R. § 1.121 the following claim will replace all prior versions of the claim in the application.

1. (Currently Amended) An image processing method for evaluating matching between a template image and an input image by use of a similarity value map, comprising:

generating a first evaluation vector for said template image, said first evaluation vector based on a normalized edge normal direction vector for said template image;

generating a second evaluation vector for said input image; and

performing an even-number times angular transformation on a component of an edge normal direction vector of said first and second evaluation vectors.

2. (Currently Amended) An image processing method comprising:

inputting a specified image for a template image;

inputting a specified image for an input image;

calculating ~~an~~ a first edge normal direction vector of said specified image for said template image;

calculating a second edge normal direction vector of said specified image for said input image;

normalizing said first edge normal direction vector;

generating ~~an~~ a first evaluation vector from said edge normal direction vector of
said specified image for said template image based on said normalized first edge normal
direction vector;

generating a second evaluation vector from said edge normal direction vector of
said specified image for said input image

subjecting said first and second evaluation ~~vector~~ vectors to orthogonal transformation;

performing a product sum calculation of corresponding spectral data for each evaluation vector that has been subjected to orthogonal transformation ~~and has been obtained for~~
~~said template image-said input image;~~

subjecting a result of said product sum calculation to inverse orthogonal transformation and generating a map of similarity values; and

a formula of said similarity values, said orthogonal transformation, and said inverse orthogonal transformation each have linearity.

3. (Original) The image processing method of Claim 2, further comprising compressing each evaluation vector that has been subjected to orthogonal transformation so as to reduce a processing amount.

4. (Original) The image processing method of Claim 2, wherein for said template image, the steps taken until said evaluation vector that has been subjected to orthogonal transformation is compressed are executed before said input image is input, and storing results thereof.

5. (Original) The image processing method of Claim 2, further comprising normalizing said evaluation vector with respect to a vector length.
6. (Original) The image processing method of Claim 2, further comprising normalizing said evaluation vector of said template image by the number of edge normal direction vectors.
7. (Original) The image processing method of Claim 2, further comprising:
 - reducing a data amount using complex conjugate properties of orthogonal transformation before performing a product sum calculation; and
 - restoring said data amount after performing said product sum calculation.
8. (Original) The image processing method of Claim 2, further comprising:
 - enlarging/reducing said template image to various sizes; and
 - subjecting said evaluation vector of each size to addition processing.
9. (Original) The image processing method of Claim 8, wherein, for said template image, said addition processing of said evaluation vector is carried out after executing said step of compressing each evaluation vector so as to reduce the processing amount.
10. (Original) The image processing method of Claim 2, wherein said template image is an image of a typified face.

15. (Original) The image processing method of Claim 10, further comprising generating a map of point biserial correlation coefficients on the basis of an extracted face image; and

responsive to said correlation coefficients, calculating a position of said face part.

16. (Original) The image processing method of Claim 10, further comprising:

calculating a distribution of projection values in a y-direction on the basis of said extracted face image by use of said mask pattern;

calculating two maximum points from said distribution; and

outputting a range between said two maximum points as a mouth range.

17. (Original) The image processing method of Claim 10, further comprising:

dividing said input image into only said face image and parts other than said face image on the basis of said extracted face image;

embedding a digital watermark only into said face image;

combining said face image into which said digital watermark has been embedded with parts other than said face image to produce a combined result; and

outputting said combined result.

18. (Original) The image processing method of Claim 10, further comprising:

dividing said input image into only said face image and parts other than said face image on the basis of said extracted face image;

editing only said face image;

subjected to said orthogonal transformation and has been obtained for said template image and said input image; and

an inverse orthogonal transformation means unit;

~~said inverse orthogonal transformation means including means for subjecting operable to~~
subject a result of said product sum calculation to inverse orthogonal transformation and
~~generating further operable to generate~~ a map of similarity values;

said evaluation vector including a component in which an edge normal direction vector of a specified image undergoes even-numbered times angular transformation, and a formula of said similarity values, said orthogonal transformation, and said inverse orthogonal transformation each have linearity.

20. (Currently Amended) The image processing apparatus of Claim 19, wherein said template image processing part includes a recording ~~means for recording~~ unit operable to record said evaluation vector that has been compressed to reduce a processing amount and that has been subjected to orthogonal transformation, and a result obtained by compressing said evaluation vector that has been subjected to orthogonal transformation is stored in said recording ~~means~~ unit before inputting said input image.

21. (Currently Amended) The image processing apparatus of Claim 19, further comprising:

a conjugate compression means unit between said recording means unit and said multiplication means unit;

said conjugate compression ~~means unit including means for reducing~~ operable to reduce the data amount using complex conjugate properties of orthogonal transformation;

a conjugate restoring ~~means unit~~;

~~said conjugate restoring unit~~, between said multiplication ~~means unit~~ and said inverse orthogonal transformation ~~means unit~~; ~~including means for restoring~~ said conjugate restoring unit operable to restore the data amount reduced by use of the complex conjugate properties of orthogonal transformation.

22. (Currently Amended) The image processing apparatus of Claim 19, further comprising:

an enlargement/reduction ~~means for enlarging/reducing~~ unit operable to enlarge or reduce said template image to various sizes; and

an addition ~~means for performing~~ unit operable to perform addition processing of said evaluation vector of each size.

23. (Currently Amended) The image processing apparatus of Claim 22, wherein said addition ~~means unit includes means for performing~~ is further operable to perform addition processing of said evaluation vector of said template image after compressing said vector so as to reduce the processing amount.

24. (Currently Amended) The image processing apparatus of Claim 19, further comprising a peak pattern processing ~~part for subjecting~~ unit operable to subject a peak pattern by which a peak of a similarity value is made steep to orthogonal transformation and ~~compressing~~ compress

said peak pattern that has been subjected to said orthogonal transformation so as to reduce the processing amount, wherein a result obtained by subjecting data of this peak pattern to said orthogonal transformation is applied to a product sum calculation of said multiplication ~~means~~ unit.

25. (Currently Amended) The image processing apparatus of Claim 19, further comprising:

a mask pattern processing part; ~~and~~

~~said mask pattern processing part including means for forming~~ operable to form a mask pattern that depends on said template image and ~~generating~~ generate data obtained by subjecting data of this mask pattern to orthogonal transformation and by compressing it, wherein a processing result of said mask pattern processing part is applied to a product sum calculation of said multiplication ~~means~~ unit.

26. (Original) The image processing apparatus of Claim 25, wherein said mask pattern includes a mean of a number of pixels inside an image of said template image.

27. (Currently Amended) The image processing apparatus of Claim 20, further comprising:

a symmetric vector generation ~~means~~ unit;

~~said symmetric vector generation means including means for processing~~ operable to process positive and negative signs of said evaluation vector of an original template image recorded in said recording ~~means~~ unit, and ~~for generating~~ further operable to generate an evaluation vector of a bilaterally symmetric image with respect to said original template image,

wherein said evaluation vector generated by said symmetric vector generation ~~means~~ unit is applied to a product sum calculation of said multiplication ~~means~~ unit.

28. (Currently Amended) The image processing apparatus of Claim 19, further comprising a map forming ~~means~~ unit operable to form ~~for-forming~~ a map of a point biserial correlation coefficient on the basis of an extracted face image, and an extraction ~~means-for-calculating~~ unit operable to calculate a position of a face part from the formed map.

29. (Currently Amended) The image processing apparatus of Claim 19, further comprising a maximum point extraction ~~means-for-calculating~~ unit operable to calculate a projection value distribution in a y direction by use of a mask pattern on the basis of an extracted face image, and ~~ealeulating~~ further operable to calculate two maximum points from this distribution, and outputting a range between said maximum points such as a mouth range.

30. (Currently Amended) The image processing apparatus of Claim 19, further comprising:

a face image cutting-out ~~means-for-separating~~ unit operable to separate an input image into only a face image and parts excluding said face image on the basis of an extracted face image;

a digital watermark embedding ~~means-for-embedding~~ unit operable to embed a digital watermark only into the face image; and

